

## Mechanical Engineering Conversion Factors

compiled by Dr. K. Clark Midkiff

**g<sub>c</sub>**

$$g_c = 1 = 32.178 \frac{\text{ft} \cdot \text{lbf}}{\text{lbf} \cdot \text{sec}^2} = 1 \frac{\text{kg} \cdot \text{m}}{\text{N} \cdot \text{s}^2} = 1 \frac{\text{slug} \cdot \text{ft}}{\text{lbf} \cdot \text{sec}^2}$$

**ANGULAR  
VELOCITY**

$$\begin{aligned} 1 \text{ RPM} &= 1 \text{ rev/min} = 1/60 \text{ rev/sec} = 2\pi/60 \text{ rad/sec} = 0.10472 \text{ rad/sec} \\ 1 \text{ rad/sec} &= 1/2\pi \text{ rev/sec} = 60/2\pi \text{ rev/min} = 9.549 \text{ RPM} \\ 1 \text{ Hz} &= 1 \text{ hertz} = 1 \text{ rev/sec} = 60 \text{ rev/min} = 60 \text{ RPM} \\ 1 \text{ Hz} &= 1 \text{ hertz} = 1 \text{ rev/sec} = 2\pi \text{ rad/sec} = 6.283 \text{ rad/sec} \end{aligned}$$

**LENGTH**

$$\begin{aligned} 1 \text{ in} &= 2.54 \text{ cm} = 0.0254 \text{ m} = 25.4 \text{ mm} \\ 1 \text{ m} &= 3.2808 \text{ ft} = 39.37 \text{ in} = 100 \text{ cm} = 10^6 \text{ lm} = 10^{10} \text{ Angstrom} \\ 1 \text{ ft} &= 0.3048 \text{ m} = 12 \text{ in} = 30.48 \text{ cm} = 0.33333 \text{ yd} \\ 1 \text{ km} &= 1000 \text{ m} = 0.621 \text{ mi} \\ 1 \text{ mi} &= 5280 \text{ ft} = 1760 \text{ yd} = 1609.4 \text{ m} \end{aligned}$$

**AREA**

$$\begin{aligned} 1 \text{ m}^2 &= 10.76 \text{ ft}^2 = 10^4 \text{ cm}^2 \\ 1 \text{ ft}^2 &= 144 \text{ in}^2 = 0.09291 \text{ m}^2 = 929.1 \text{ cm}^2 \end{aligned}$$

**VOLUME**

$$\begin{aligned} 1 \text{ gal} &= 0.13368 \text{ ft}^3 = 3.785 \text{ L} = 4 \text{ qt} = 8 \text{ pints} = 16 \text{ cups} = 256 \text{ Tbsp} \\ 1 \text{ L} &= 10^{-3} \text{ m}^3 = 10^3 \text{ cm}^3 = 1.057 \text{ qt} = 0.03531 \text{ ft}^3 \\ 1 \text{ m}^3 &= 35.31 \text{ ft}^3 = 1000 \text{ L} = 264.1 \text{ gal} = 1.308 \text{ yd}^3 \end{aligned}$$

**TIME**

$$1 \text{ hr} = 60 \text{ min} = 3600 \text{ s}, \quad 1 \text{ yr} = 52.14 \text{ wks} = 365 \text{ days} = 8760 \text{ hr}$$

**MASS**

$$\begin{aligned} 1 \text{ lbm} &= 0.4536 \text{ kg} = 453.6 \text{ g} = 16 \text{ oz. Av.} = 0.031081 \text{ slugs} \\ 1 \text{ kg} &= 1000 \text{ g} = 2.2046 \text{ lbm} = 35.27 \text{ oz. Av.} = 0.068521 \text{ slugs} \end{aligned}$$

**FORCE**

$$\begin{aligned} 1 \text{ N} &= 1 \text{ kg} \cdot \text{m/s}^2 = 0.2248 \text{ lbf} = 105 \text{ dyn} = 10^5 \text{ g} \cdot \text{cm/s}^2 \\ 1 \text{ lbf} &= 4.448 \text{ N} = 4.448 \times 10^5 \text{ dyn} \end{aligned}$$

**ENERGY**

$$\begin{aligned} 1 \text{ J} &= 1 \text{ kg} \cdot \text{m}^2/\text{s}^2 = 10^7 \text{ g} \cdot \text{cm}^2/\text{s}^2 = 1 \text{ N} \cdot \text{m} = 0.7376 \text{ ft-lbf} \\ 1 \text{ Btu} &= 778.16 \text{ ft-lbf} = 1.055 \times 10^6 \text{ erga} = 252 \text{ cal} = 1055.0 \text{ J} \\ 1 \text{ cal} &= 4.186 \text{ J} = 3.088 \text{ ft-lbf} \\ 1 \text{ kcal} &= 4186 \text{ J} = 1000 \text{ cal} = 3.968 \text{ Btu} \\ 1 \text{ kJ} &= 0.94781 \text{ Btu} = 0.23884 \text{ kcal} = 1 \text{kPa} \cdot \text{m}^3 = 6.242 \times 10^{21} \text{ eV} \end{aligned}$$

**POWER**

$$\begin{aligned} 1 \text{ W} &= 1 \text{ kg} \cdot \text{m}^2/\text{s}^3 = 1 \text{ J/s} = 1 \text{ N} \cdot \text{m/s} = 3.412 \text{ Btu/hr} \\ 1 \text{ hp} &= 550 \text{ ft-lbf/s} = 746 \text{ W} = 33000 \text{ ft-lbf/min} = 2545 \text{ Btu/h} \\ 1 \text{ kW} &= 1000 \text{ W} = 3412 \text{ Btu/h} \end{aligned}$$

**PRESSURE**

$$\begin{aligned} 1 \text{ atm} &= 14.696 \text{ lbf/in}^2 = 760 \text{ torr} = 101325 \text{ Pa} = 29.92 \text{ in Hg} \\ 1 \text{ Pa} &= 1 \text{ N/m}^2 = 1 \text{ kg/m} \cdot \text{s}^2 = 1 \text{ J/m}^3 = 1.4504 \times 10^{-4} \text{ lbf/in}^2 \\ 1 \text{ lbf/in}^2 &= 1 \text{ psi} = 6894.6 \text{ Pa} = 2.0418 \text{ in Hg} = 144 \text{ lbf/ft}^2 \\ 1 \text{ in Hg} &= 3376.8 \text{ Pa} = 0.4898 \text{ lbf/in}^2 = 13.57 \text{ in H}_2\text{O} \\ 1 \text{ in H}_2\text{O} &= 248.8 \text{ Pa} = 0.0361 \text{ lbf/in}^2 \end{aligned}$$